



for Microplates –
Footprint Dimensions

Secretariat
Society for Biomolecular Screening

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Foreword

As early as the first meeting of the Society for Biomolecular Screening (SBS) in 1995, a need for clearly defined dimensional standards of a microplate were identified. At the time, the microplate was already becoming an essential tool used in drug discovery research. At the time, the concept of a microplate was similar among various manufacturers, but the dimensions of microplates produced by different vendors, and even within a single vendors catalog line varied. This often caused numerous problems when microplates were to be used in automated laboratory instrumentation.

In late 1995, members of the SBS began working on defining dimensional standards for the standard 96 well microplate. The first written proposal was released in December 1995 and presented at numerous scientific conferences and journals throughout 1996. This initial proposed standard was officially presented to the membership of SBS for approval at the annual meeting in October 1996 in Basel, Switzerland. Between then and late 1998, various versions of the proposed standards for 96 and 384 well microplates were circulated to the membership of the society. In early 1999, efforts to begin formalizing the proposed standards in preparation for submission to a recognized standards organization were begun. The email ListServ was started in March, and the first regular quarterly meeting of the working committee met in August of that year. To date, the ListServ contains members representing over 100 corporations, educational institutions, and government organizations from over 15 nations.

There is one annex in this standard. Annex A is informative and not considered part of this standard. It is provided as an aid only for the interpretation of specific elements of ASME Y14.5 as they apply to figures in SBS standards.

Suggestions for improvement of this standard will be welcome. They should be sent to the Microplate Standards Development Committee of the Society for Biomolecular Screening, 36 Tamarack Avenue, Suite 348, Danbury, CT 06811.

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Marc Feiglin, Co-chair
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Co Bio Engineering³
Corning¹
Greiner BioOne¹
Hamilton Co²
Hoffman La Roche³

MatriCal¹
Merck & Co³
Millipore¹
MJ Research^{1,2}
Molecular Devices^{1,2}
REMP²
Tecan²
Thermo Electron²
Whatman¹

Interest groups

1. Manufacturers of microplates (n=10)
2. Manufacturers of instrumentation that utilizes microplates (n=8)
3. Users of microplates that do not fit in either of the previous categories (n=4)

1 Scope and purpose

1.1 Scope

This standard defines the dimensional requirements of the footprint of a microplate as specified in American National Standards covering these microplates.

1.2 Purpose

It is the purpose of this standard to describe the minimal dimensions required of a microplate that is considered to meet the standards. This standard also outlines the conditions required for making necessary measurements. Unless otherwise specified, all dimensions are applicable at 20 degrees C (68 degrees F). Compensation may be made for measurements made at other temperatures.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. ASME Y14.5M-1994, *Dimensioning and Tolerancing*

3 Definitions

There are many terms and definitions associated with microplates that have special meaning to the industry. The following are definitions of terms used in this document:

3.1 ASME: Abbreviation for the American Society of Mechanical Engineers

3.2 ANSI: Abbreviation for the American National Standards Institute, Inc.

3.3 SBS: Abbreviation for the Society for Biomolecular Screening.

4 Microplate footprint

4.1 Normal tolerances

4.1.1 Footprint

4.1.1.1 The outside dimension of the base footprint, measured within 12.7 mm (0.5000 inches) of the outside corners, shall be as follows:

- Length 127.76 mm \pm 0.25 mm (5.0299 inches \pm 0.0098 inches)
- Width 85.48 mm \pm 0.25 mm (3.3654 inches \pm 0.0098 inches)

4.1.1.2 The outside dimension of the base footprint, measured at any point along the side, shall be as follows:

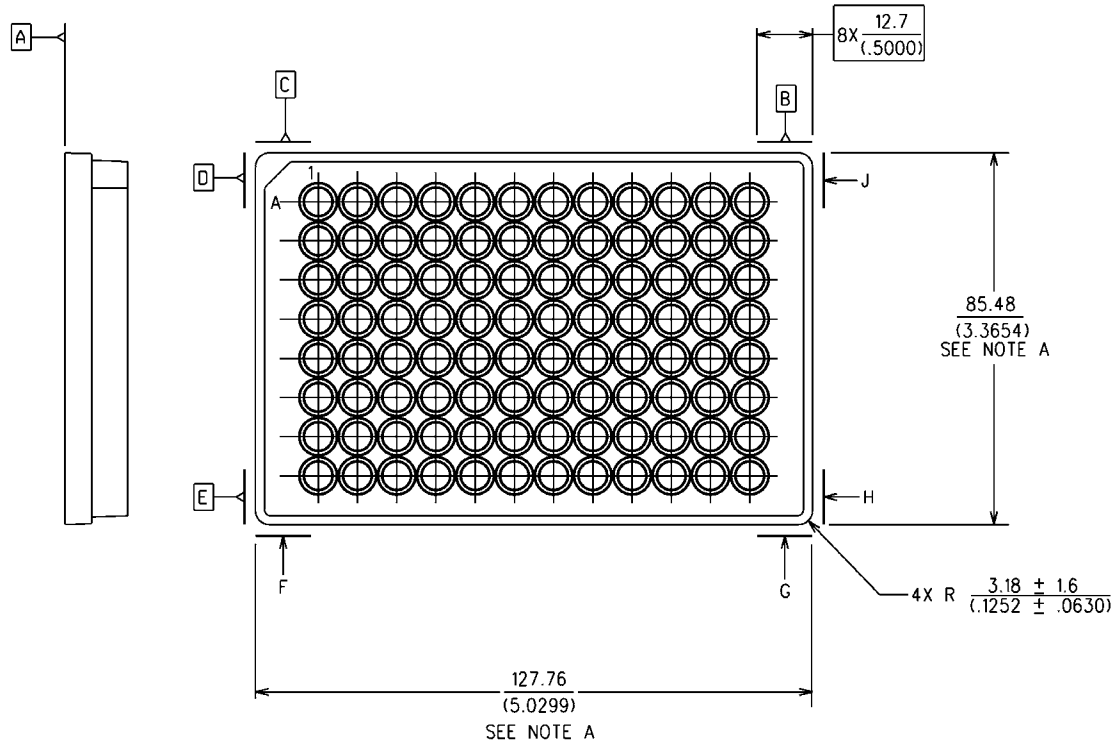
- Length 127.76 mm \pm 0.5 mm (5.0299 inches \pm 0.0197 inches)
- Width 85.48 mm \pm 0.5 mm (3.3654 inches \pm 0.0197 inches)

4.1.1.3 The footprint must be continuous and uninterrupted around the base of the plate.

4.1.2 Corner Radius

4.1.2.1 The four outside corners of the plate's bottom flange shall have a corner radius to the outside of 3.18 mm \pm 1.6 mm (0.1252 inch \pm 0.0630 inches)

Figure



NOTES:

- 1 The drawing standard used is ASME Y14.5M-1994
- 2 The geometry shown is for illustration only and does not imply any preferred or required construction.
- 3 Dimensions shown are: Millimeters / (Inches)
- 4 Dimensions and tolerances do not include draft.
- 5 The footprint must be continuous and uninterrupted around the base of the plate.
- A A tolerance ± 0.5 mm (0.0197 inches) applies overall, a tolerance of ± 0.25 mm (0.0098 inches) applies at zones B-G, C-F, D-J & E-H.

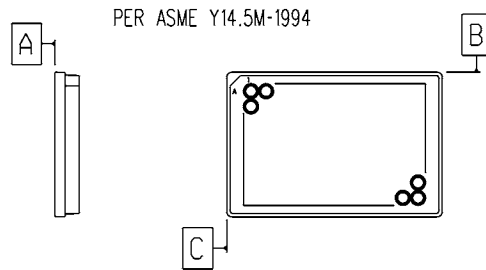
Figure 1- Microplate Footprint

Annex

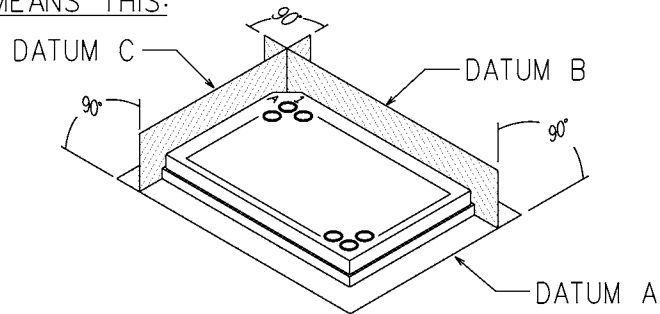
Annex A (Informative) Interpretation of Figures

Annex A is a general guide to interpreting figures in SBS standards in accordance with ASME Y14.5M-1994. Annex A is not intended to be a substitute for a working knowledge of dimensioning and tolerancing practices contained therein. The specific examples in Annex A are not comprehensive and may or may not apply to the figures in this particular SBS standard.

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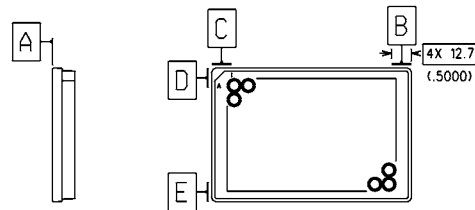
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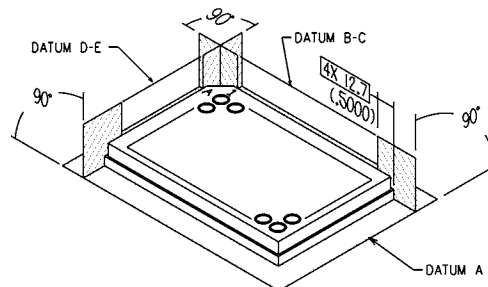
A.1 Specifying datum

THIS ON THE DRAWING:

PER ASME Y14.5M-1994 PARAGRAPH 1.7.3, 4.5.10, 6.3.1.2



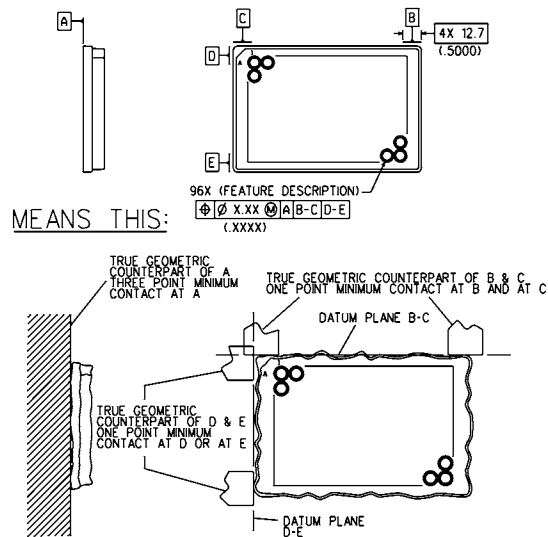
MEANS THIS:



A.2 Specifying composite datum

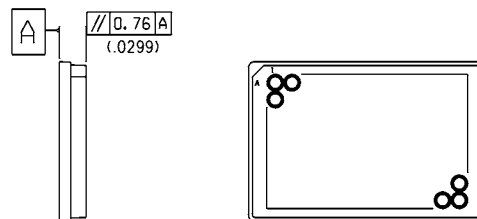
THIS ON THE DRAWING:

PER ASME Y14.5M-1994
PARAGRAPH 1.7.3, 4.5.10, 4.5.7.1



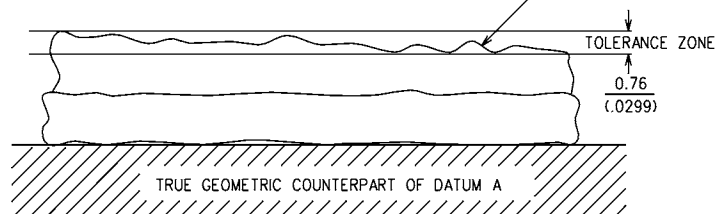
A.3 Application of composite datum

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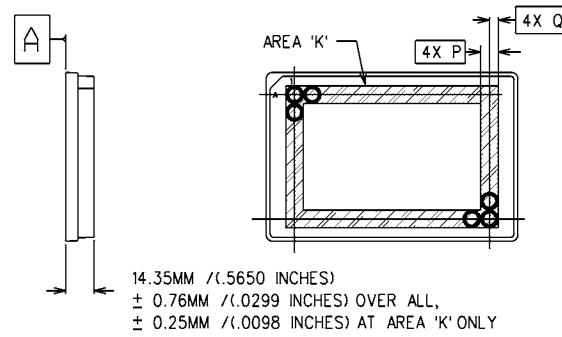
MEANS THIS: PER ASME Y14.5M-1994 PARAGRAPH 6.6.3.1

CONTROLLED SURFACE MUST LAY WITHIN A 0.76MM \pm (.0299 INCH) WIDE TOLERANCE ZONE, PARALLEL WITH DATUM A, AND MUST NOT EXCEED LIMITS OF SIZE



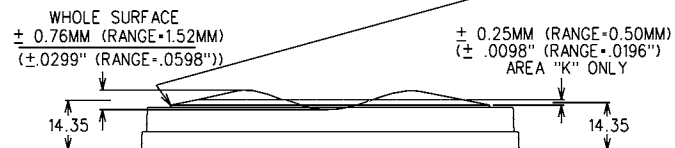
A.4 Parallelism

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MEANS THIS:

PER ASME Y14.5M-1994 PARAGRAPH 1.7.3
 (STEP ALLOWED PER SBS-2 SHOWN FOR CLARITY)



A.5 Tolerances over a limited area



for Microplates –
Height Dimensions

Secretariat
Society for Biomolecular Screening

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Foreword

As early as the first meeting of the Society for Biomolecular Screening (SBS) in 1995, a need for clearly defined dimensional standards of a microplate were identified. At the time, the microplate was already becoming an essential tool used in drug discovery research. At the time, the concept of a microplate was similar among various manufacturers, but the dimensions of microplates produced by different vendors, and even within a single vendors catalog line varied. This often caused numerous problems when microplates were to be used in automated laboratory instrumentation.

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Interest groups

1. Manufacturers of microplates (n=10)
2. Manufacturers of instrumentation that utilizes microplates (n=8)
3. Users of microplates that do not fit in either of the previous categories (n=4)

1 Scope and purpose

1.1 Scope

This standard defines the dimensional requirements of the height of a microplate as specified in American National Standards covering these microplates.

1.2 Purpose

It is the purpose of this standard to describe the minimal dimensions required of a microplate that is considered to meet the standards. This standard also outlines the conditions required for making necessary measurements. Unless otherwise specified, all dimensions are applicable at 20 degrees C (68 degrees F). Compensation may be made for measurements made at other temperatures.

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4 Microplate height

Microplates that meet this standard may either comply with those standards specified in parts 4.1, or 4.2. Microplates, or instruments that use them, that advertise compliance with this standard must clearly state which of these two parts they meet.

4.1 Typical height with clearance

4.1.1 Plate height

4.1.1.1 The plate height, measured from Datum A (the resting plane) to the maximum protrusion of the perimeter wells, shall be 14.35 mm \pm 0.25 mm (0.5650 inches \pm 0.0098 inches)

4.1.1.2 The overall plate height, measured from Datum A (the resting plane) to the maximum protrusion of the plate, shall be 14.35 mm \pm 0.76 mm (0.5650 inches \pm 0.0299 inches)

4.1.2 Top Surface

4.1.2.1 The maximum allowable projection above the top-stacking surface is 0.76 mm (0.0299 inches). The top-stacking surface is defined as that surface on which another plate would rest when stacked one on another.

4.1.2.2 When resting on a flat surface, the top surface of the plate must be parallel to the resting surface within 0.76 mm (0.0299 inches)

4.1.3 External Clearance to the Plate Bottom

The minimum clearance from Datum A (the resting plane) to the plane of the bottom external surface of the wells shall be 1 mm (0.0394 inches). This clearance is limited to the area of the wells.

4.2 Typical height

4.2.1 Plate height

4.2.1.1 The plate height, measured from Datum A (the resting plane) to the maximum protrusion of the perimeter wells, shall be $14.35 \text{ mm} \pm 0.25 \text{ mm}$ ($0.5650 \text{ inches} \pm 0.0098 \text{ inches}$)

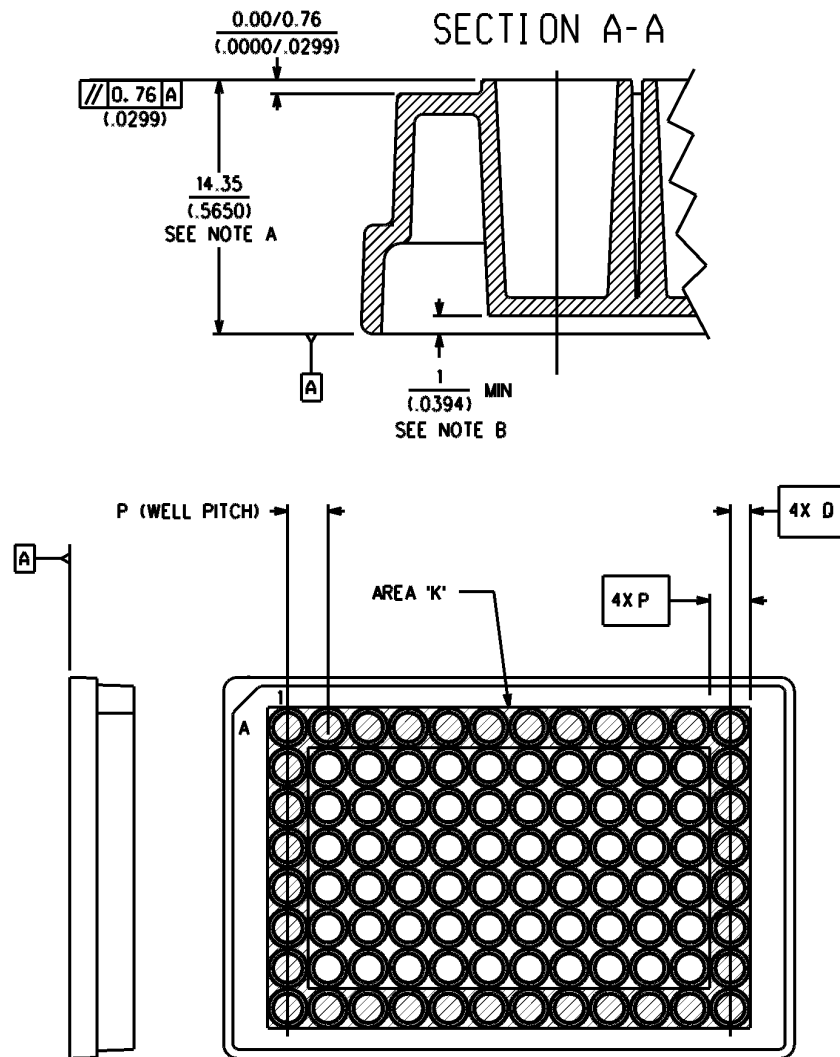
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Figure



NO. OF WELLS	96 (SHOWN)	384	1536
P (WELL PITCH)	9/(.3543)	4.5/(.1772)	2.25/(.0886)
Q (HALF P)	4.5/(.1772)	2.25/(.0886)	1.125/(.0443)

NOTES:

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- 2 The geometry shown is for illustration only and does not imply any preferred or required construction.
- 3 Dimensions shown are: Millimeters / (Inches)
- 4 Dimensions and tolerances do not include draft.
- A Typical height = 14.35 mm (0.56560 inches) ± 0.76 mm (0.0299 inches) applied overall, and a tolerance of ± 0.25 mm (0.0098 inches) applied within area "K".
- B The 1mm (0.0394 inch) clearance applies in the area of the wells only.

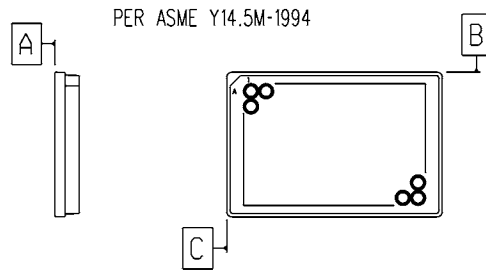
Figure 1- Mechanical drawings defining the height of a typical microplate

Annex

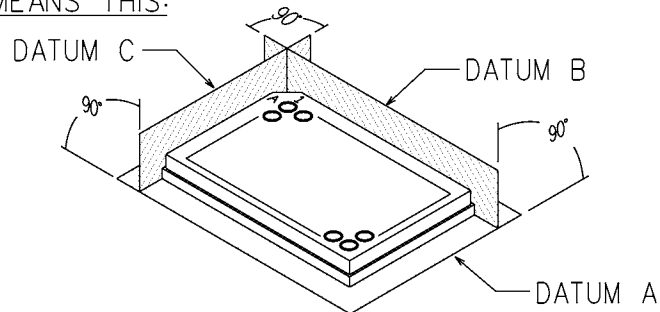
Annex A (Informative) Interpretation of Figures

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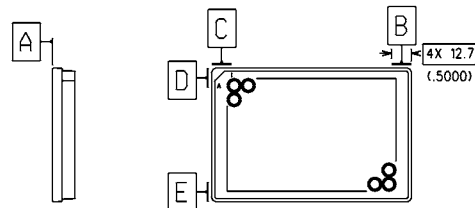
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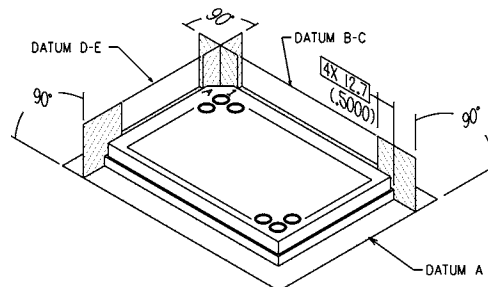
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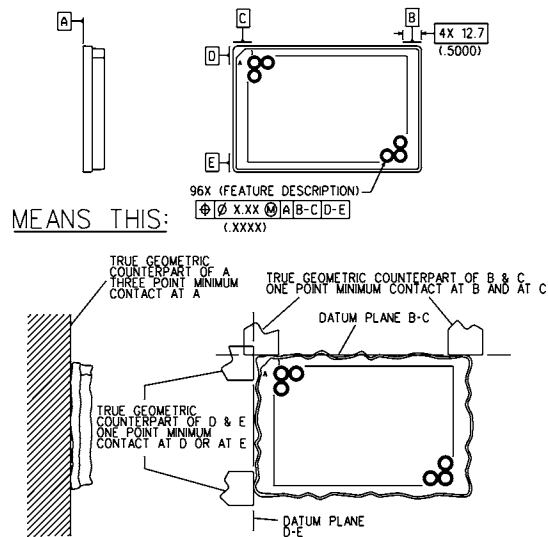
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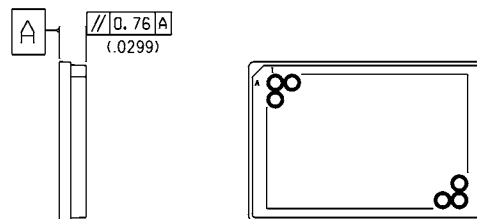
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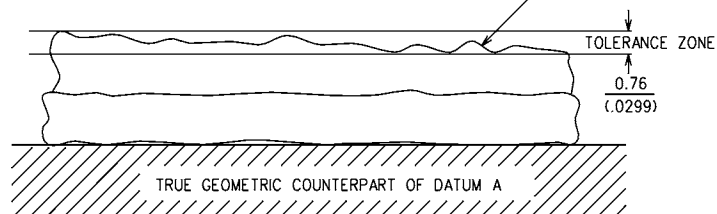
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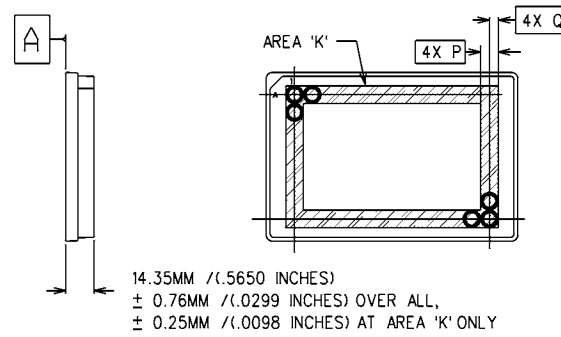
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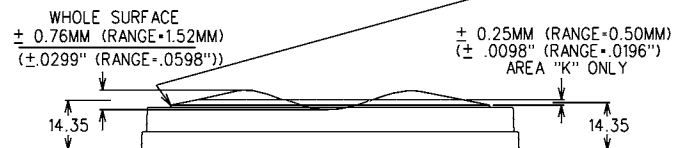
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A.5 Tolerances over a limited area



for Microplates –
Bottom Outside Flange Dimensions

Secretariat
Society for Biomolecular Screening

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Foreword

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2. Manufacturers of instrumentation that utilizes microplates (n=8)
3. Users of microplates that do not fit in either of the previous categories (n=4)

1 Scope and purpose

1.1 Scope

This standard defines the dimensional requirements of the bottom outside flange of a microplate as specified in American National Standards covering these microplates.

1.2 Purpose

It is the purpose of this standard to describe the minimal dimensions required of a microplate that is considered to meet the standards. This standard also outlines the conditions required for making necessary measurements. Unless otherwise specified, all dimensions are applicable at 20 degrees C (68 degrees F). Compensation may be made for measurements made at other temperatures.

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4 Bottom-outside flange

Microplates that meet this standard may either comply with those standards specified in parts 4.1, 4.2, 4.3, 4.4, or 4.5. Microplates, or instruments that use them, that advertise compliance with this standard must clearly state which of these five parts they meet.

4.1 Short flange height

4.1.1 Flange height

4.1.1.1 The height of the bottom outside flange shall be $2.41 \text{ mm} \pm 0.38 \text{ mm}$ ($0.0948 \text{ inches} \pm 0.0150 \text{ inches}$). This is measured from Datum A (the bottom-resting plane) to the top of the flange.

4.1.1.2 All four sides must have the same flange height.

4.1.2 Flange width

4.1.2.1 The width of the bottom outside flange measured at the top of the flange shall be a minimum of 1.27 mm (0.0500 inches).

4.1.3 Chamfers (Corner Notches)

4.1.3.1 The quantity and location of chamfer(s) is optional. If used, the chamfer must not include the flange.

4.2 Medium flange height

4.2.1 Flange height

4.2.1.1 The height of the bottom outside flange shall be $6.10 \text{ mm} \pm 0.38 \text{ mm}$ ($0.2402 \text{ inches} \pm 0.0150 \text{ inches}$). This is measured from Datum A (the bottom-resting plane) to the top of the flange.

4.2.1.2 All four sides must have the same flange height.

4.2.2 Flange width

4.2.2.1 The width of the bottom outside flange measured at the top of the flange shall be a minimum of 1.27 mm (0.0500 inches).

4.2.3 Chamfers (Corner Notches)

4.2.3.1 The quantity and location of chamfer(s) is optional. If used, the chamfer must not include the flange.

4.3 Tall flange height

4.3.1 Flange height

4.3.1.1 The height of the bottom outside flange shall be $7.62 \text{ mm} \pm 0.38 \text{ mm}$ ($0.3000 \text{ inches} \pm 0.0150 \text{ inches}$). This is measured from Datum A (the bottom-resting plane) to the top of the flange.

4.3.1.2 All four sides must have the same flange height.

4.3.2 Flange width

4.3.2.1 The width of the bottom outside flange measured at the top of the flange shall be a minimum of 1.27 mm (0.0500 inches).

4.3.3 Chamfers (Corner Notches)

4.3.3.1 The quantity and location of chamfer(s) is optional. If used, the chamfer must not include the flange.

4.4 Short flange height with interruptions

4.4.1 Flange height

4.4.1.1 The height of the bottom outside flange shall be $2.41 \text{ mm} \pm 0.38 \text{ mm}$ ($0.0948 \text{ inches} \pm 0.0150 \text{ inches}$). This is measured from Datum A (the bottom-resting plane) to the top of the flange.

4.4.1.2 All four sides must have the same flange height except for an allowable interruption centered along the long side.

4.4.2 Interruptions

4.4.2.1 Each of the long sides of the plate shall be allowed to have a single interruption or projection on center.

4.4.2.2 Each edge of the interruption shall be a minimum of 47.8 mm (1.8819 inches) from the nearest edge of the part.

4.4.2.3 The height of the flange at the interruption shall not exceed 6.85 mm (0.2697 inches)

4.4.3 Flange width

4.4.3.1 The width of the bottom outside flange measured at the top of the flange shall be a minimum of 1.27 mm (0.0500 inches).

4.4.4 Chamfers (Corner Notches)

4.4.4.1 The quantity and location of chamfer(s) is optional. If used, the chamfer must not include the flange.

4.5 Dual flange heights

4.5.1 Flange height

4.5.1.1 The height of the bottom outside flange shall be $2.41 \text{ mm} \pm 0.38 \text{ mm}$ ($0.0948 \text{ inches} \pm 0.0150 \text{ inches}$) along the short sides of the plate. This is measured from Datum A (the bottom-resting plane) to the top of the flange.

4.5.1.2 The height of the bottom outside flange shall be $7.62 \text{ mm} \pm 0.38 \text{ mm}$ ($0.3000 \text{ inches} \pm 0.0150 \text{ inches}$) along the long sides of the plate. This is measured from Datum A (the bottom-resting plane) to the top of the flange.

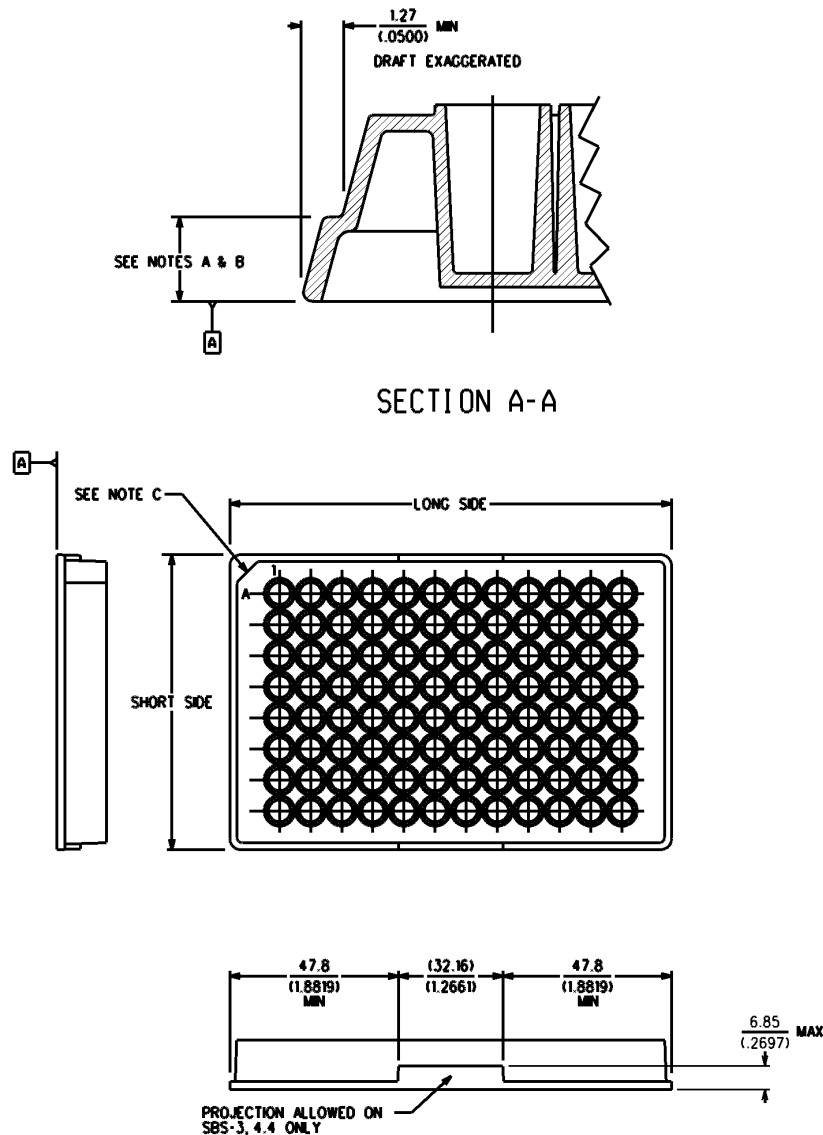
4.5.2 Flange width

4.5.2.1 The width of the bottom outside flange measured at the top of the flange shall be a minimum of 1.27 mm (0.0500 inches).

4.5.3 Chamfers (Corner Notches)

4.5.3.1 The quantity and location of chamfer(s) is optional. If used, the chamfer must not include the flange.

Figure



NOTES:

- 1 The drawing standard used is ASME Y14.5M-1994.
 - 2 The geometry shown is for illustration only and does not imply any preferred or required construction.
 - 3 Dimensions shown are: Millimeters / (Inches).
 - 4 Dimensions and tolerances do not include draft.
- A SBS-3, 4.1 short flange height = 2.41 ± 0.38 mm (0.0948 ± 0.0150 inches)
 SBS-3, 4.2 medium flange height = 6.10 ± 0.38 mm (0.2402 ± 0.0150 inches)
 SBS-3, 4.3 tall flange height = 7.62 ± 0.38 mm (0.3000 ± 0.0150 inches)
 SBS-3, 4.4 short flange height with interruptions = 2.41 ± 0.38 mm (0.0948 ± 0.0150 inches) projections allowed as shown.
 SBS-3, 4.5 dual flange heights = 2.41 ± 0.38 mm (0.0948 ± 0.0150 inches) at short sides, 7.62 ± 0.38 mm (0.3000 ± 0.0150 inches) at long sides.
- B The flange height for SBS-3a, 3b, and 3c must be the same on all four sides.
- C Quantity and location of chamfers(s) is optional. If used the chamfer must not include the flange.

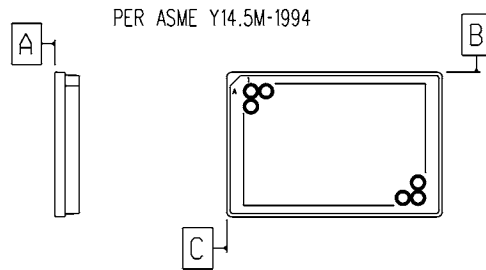
Figure 1- Mechanical drawings defining the flange dimensions of a microplate

Annex

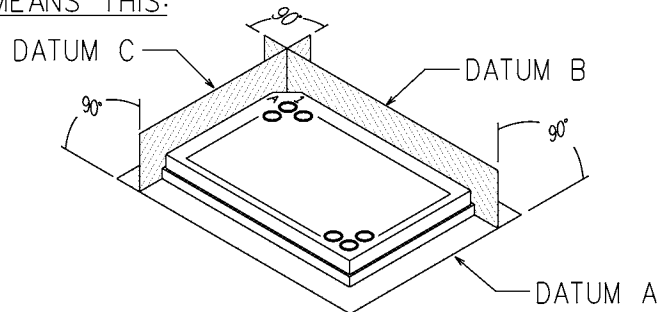
Annex A (Informative) Interpretation of Figures

Annex A is a general guide to interpreting figures in SBS standards in accordance with ASME Y14.5M-1994. Annex A is not intended to be a substitute for a working knowledge of dimensioning and tolerancing practices contained therein. The specific examples in Annex A are not comprehensive and may or may not apply to the figures in this particular SBS standard.

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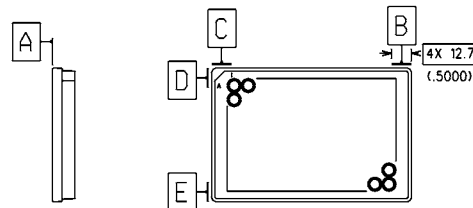
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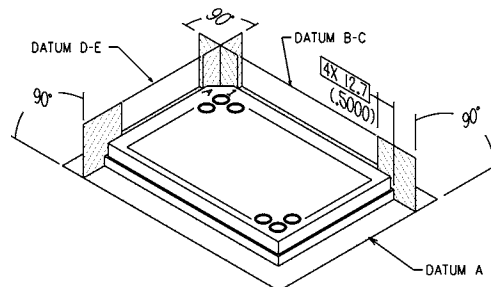
A.1 Specifying datum

THIS ON THE DRAWING:

PER ASME Y14.5M-1994 PARAGRAPH 1.7.3, 4.5.10, 6.3.1.2



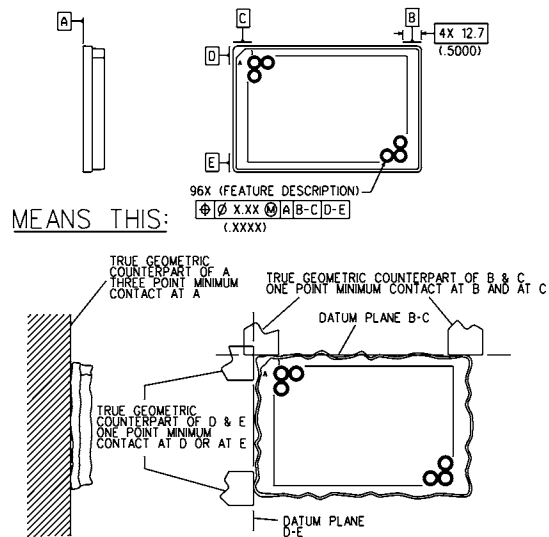
MEANS THIS:



A.2 Specifying composite datum

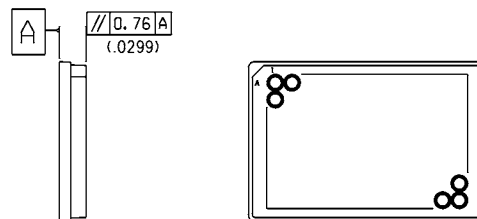
THIS ON THE DRAWING:

PER ASME Y14.5M-1994
PARAGRAPH 1.7.3, 4.5.10, 4.5.7.1



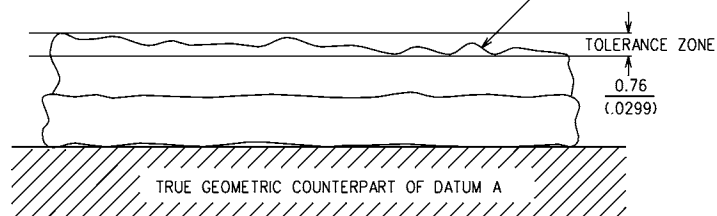
A.3 Application of composite datum

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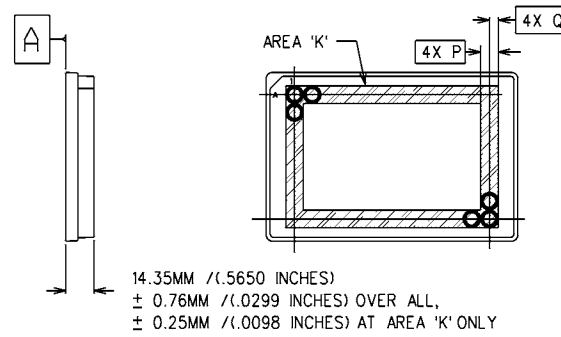
MEANS THIS: PER ASME Y14.5M-1994 PARAGRAPH 6.6.3.1

CONTROLLED SURFACE MUST LAY WITHIN A 0.76MM \pm (.0299 INCH) WIDE TOLERANCE ZONE, PARALLEL WITH DATUM A, AND MUST NOT EXCEED LIMITS OF SIZE



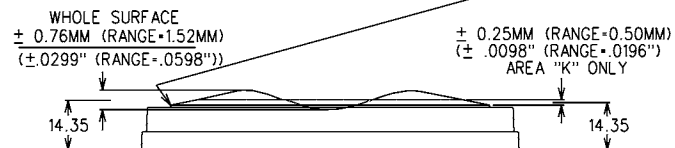
A.4 Parallelism

THIS ON THE DRAWING:



MEANS THIS:

PER ASME Y14.5M-1994 PARAGRAPH 1.7.3
 (STEP ALLOWED PER SBS-2 SHOWN FOR CLARITY)



A.5 Tolerances over a limited area



for Microplates –
Well Positions

Secretariat
Society for Biomolecular Screening

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Foreword

As early as the first meeting of the Society for Biomolecular Screening (SBS) in 1995, a need for clearly defined dimensional standards of a microplate was identified. At the time, the microplate was already becoming an essential tool used in drug discovery research. At the time, the concept of a microplate was similar among various manufacturers, but the dimensions of microplates produced by different vendors, and even within a single vendors catalog line varied. This often caused numerous problems when microplates were to be used in automated laboratory instrumentation.

In late 1995, members of the SBS began working on defining dimensional standards for the standard 96 well microplate. The first written proposal was released in December 1995 and presented at numerous scientific conferences and journals throughout 1996. This initial proposed standard was officially presented to the membership of SBS for approval at the annual meeting in October 1996 in Basel, Switzerland. Between then and late 1998, various versions of the proposed standards for 96 and 384 well microplates were circulated to the membership of the society. In early 1999, efforts to begin formalizing the proposed standards in preparation for submission to a recognized standards organization were begun. The email ListServ was started in March, and the first regular quarterly meeting of the working committee met in August of that year. To date, the ListServ contains members representing over 100 corporations, educational institutions, and government organizations from over 15 nations.

There is one annex in this standard. Annex A is informative and not considered part of this standard. It is provided as an aid only for the interpretation of specific elements of ASME Y14.5 as they apply to figures in SBS standards.

Suggestions for improvement of this standard will be welcome. They should be sent to the Microplate Standards Development Committee of the Society for Biomolecular Screening, 36 Tamarack Avenue, Suite 348, Danbury, CT 06811.

This standard was processed and approved for submittal to ANSI by the Microplate Standards Development Committee of the Society for Biomolecular Screening. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the committee had the following member organizations:

Marc Feiglin, Co-chair
Carol Homon, Co-chair

Organization Represented

Apogent Discoveries^{1,2}
BD Biosciences¹
Beckman Coulter^{1,2}
Boehringer-Ingelheim³
Co Bio Engineering³
Corning¹
Greiner BioOne¹
Hamilton Co²
Hoffman La Roche³

MatriCal¹
Merck & Co³
Millipore¹
MJ Research^{1,2}
Molecular Devices^{1,2}
REMP²
Tecan²
Thermo Electron²
Whatman¹

Interest groups

1. Manufacturers of microplates (n=10)
2. Manufacturers of instrumentation that utilizes microplates (n=8)
3. Users of microplates that do not fit in either of the previous categories (n=4)

1 Scope and purpose

1.1 Scope

This standard defines the well center positional requirements of a microplate as specified in American National Standards covering these microplates.

1.2 Purpose

It is the purpose of this standard to describe the minimal dimensions required of a microplate that is considered to meet the standards. This standard also outlines the conditions required for making necessary measurements. Unless otherwise specified, all dimensions are applicable at 20 degrees C (68 degrees F). Compensation may be made for measurements made at other temperatures.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. ASME Y14.5M-1994, *Dimensioning and Tolerancing*

3 Definitions

There are many terms and definitions associated with microplates that have special meaning to the industry. The following are definitions of terms used in this document:

3.1 ASME: Abbreviation for the American Society of Mechanical Engineers

3.2 ANSI: Abbreviation for the American National Standards Institute, Inc.

3.3 SBS: Abbreviation for the Society for Biomolecular Screening.

4 Well positions

Microplates that meet this standard may either comply with those standards specified in parts 4.1, 4.2, or 4.3. Microplates, or instruments that use them, that advertise compliance with this standard must clearly state which of these three parts they meet.

4.1 96 well microplate

4.1.1 Well layout

4.1.1.1 The wells in a 96 well microplate should be arranged as eight rows by twelve columns.

4.1.2 Well column position

4.1.2.1 The distance between the left outside edge of the plate and the center of the first column of wells shall be 14.38 mm (0.5661 inches)

4.1.2.2 The left edge of the part will be defined as the two 12.7 mm areas (as measured from the corners) as specified in SBS-1

4.1.2.3 Each following column shall be an additional 9. mm (0.3543 inches) in distance from the left outside edge of the plate.

4.1.3 Well row position

4.1.3.1 The distance between the top outside edge of the plate and the center of the first row of wells shall be 11.24 mm (0.4425 inches)

4.1.3.2 The top edge of the part will be defined as the two 12.7 mm areas (as measured from the corners) as specified in SBS-1

4.1.3.3 Each following row shall be an additional 9. mm (0.3543 inches) in distance from the top outside edge of the plate.

4.1.4 Positional Tolerance

4.1.4.1 The positional tolerance of the well centers will be specified using so called “True Position”. The center of each well will be within a 0.70 mm (0.0276 inches) diameter of the specified location. This tolerance will apply at “RFS” (regardless of feature size).

4.1.5 Well Markings

4.1.5.1 The top left well of the plate shall be marked in a distinguishing manner. Such distinguishing marks include, but are not limited to the following:

- The top left well of the plate can be marked with the letter A or numeral 1 located on the left-hand side of the well.
- The top left well of the plate can be marked with a numeral 1 located on the upper side of the well.

4.1.5.2 Additional markings may be provided.

4.2 384 well microplate

4.2.1 Well layout

4.2.1.1 The wells in a 384 well microplate should be arranged as sixteen rows by twenty-four columns.

4.2.2 Well column position

4.2.2.1 The distance between the left outside edge of the plate and the center of the first column of wells shall be 12.13 mm (0.4776 inches)

4.2.2.2 The left edge of the part will be defined as the two 12.7 mm areas (as measured from the corners) as specified in SBS-1

4.2.2.3 Each following column shall be an additional 4.5 mm (0.1772 inches) in distance from the left outside edge of the plate.

4.2.3 Well row position

4.2.3.1 The distance between the top outside edge of the plate and the center of the first row of wells shall be 8.99 mm (0.3539 inches)

4.2.3.2 The top edge of the part will be defined as the two 12.7 mm areas (as measured from the corners) as specified in SBS-1

4.2.3.3 Each following row shall be an additional 4.5 mm (0.1772 inches) in distance from the top outside edge of the plate.

4.2.4 Positional Tolerance

4.2.4.1 The positional tolerance of the well centers will be specified using so called “True Position”. The center of each well will be within a 0.70 mm (0.0276 inches) diameter of the specified location. This tolerance will apply at “RFS” (regardless of feature size).

4.2.5 Well Markings

4.2.5.1 The top left well of the plate shall be marked in a distinguishing manner. Such distinguishing marks include, but are not limited to the following:

- The top left well of the plate can be marked with the letter A or numeral 1 located on the left-hand side of the well.
- The top left well of the plate can be marked with a numeral 1 located on the upper side of the well.

4.2.5.2 Additional markings may be provided.

4.3 1536 well microplate

4.3.1 Well layout

4.3.1.1 The wells in a 1536 well microplate should be arranged as thirty-two rows by forty-eight columns.

4.3.2 Well column position

4.3.2.1 The distance between the left outside edge of the plate and the center of the first column of wells shall be 11.005 mm (0.4333 inches)

4.3.2.2 The left edge of the part will be defined as the two 12.7 mm areas (as measured from the corners) as specified in SBS-1

4.3.2.3 Each following column shall be an additional 2.25 mm (0.0886 inches) in distance from the left outside edge of the plate.

4.3.3 Well row position

4.3.3.1 The distance between the top outside edge of the plate and the center of the first row of wells shall be 7.865 mm (0.3096 inches)

4.3.3.2 The top edge of the part will be defined as the two 12.7 mm areas (as measured from the corners) as specified in SBS-1

4.3.3.3 Each following row shall be an additional 2.25 mm (0.0886 inches) in distance from the top outside edge of the plate.

4.3.4 Positional Tolerance

4.3.4.1 The positional tolerance of the well centers will be specified using so called “True Position”. The center of each well will be within a 0.50 mm (0.0197 inches) diameter of the specified location. This tolerance will apply at “RFS” (regardless of feature size).

4.3.5 Well Markings

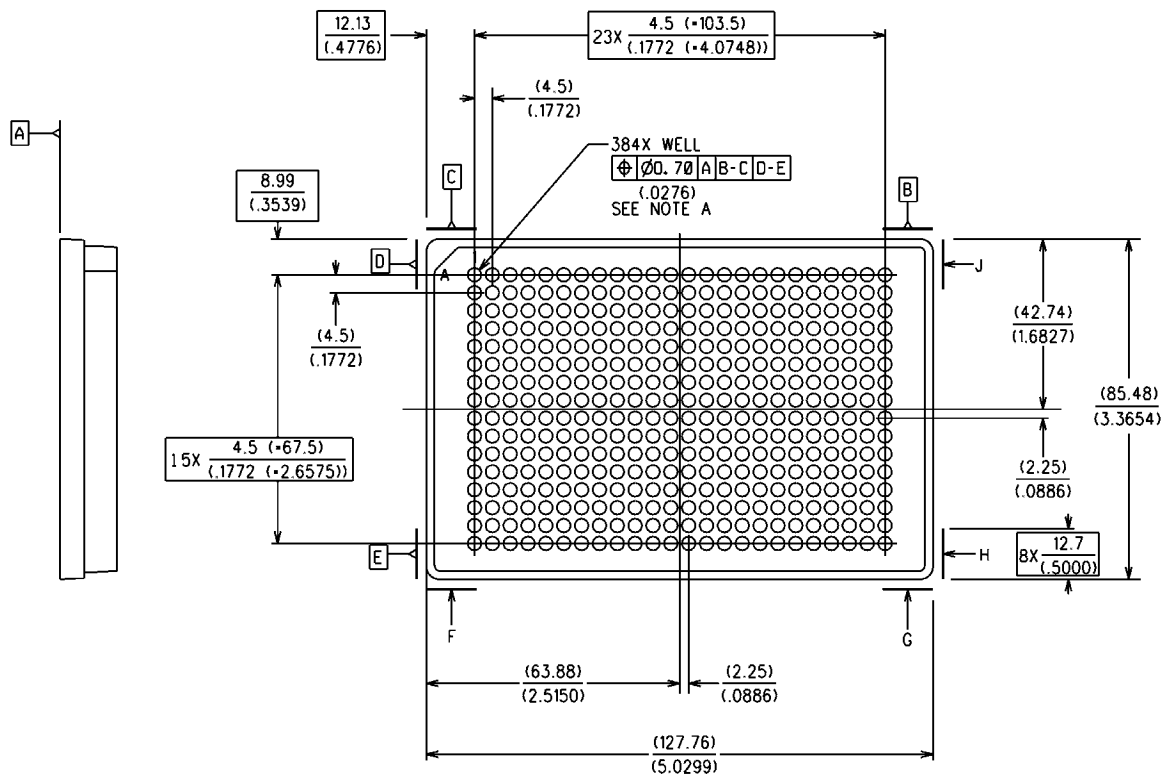
4.3.5.1 The top left well of the plate shall be marked in a distinguishing manner. Such distinguishing marks include, but are not limited to the following:

- The top left well of the plate can be marked with the letter A or numeral 1 located on the left-hand side of the well.
- The top left well of the plate can be marked with a numeral 1 located on the upper side of the well.

4.3.5.2 Additional markings may be provided.

[illegible]

1 The drawing standard used is ASME Y14.5M-1994
2 The geometry shown is for illustration only and does not imply any preferred or required construction.
3 Dimensions shown are: Millimeters / (Inches)
4 Dimensions and tolerances do not include draft.
A The top left well of the plate shall be clearly marked (e.g.: on the left with the letter “A” or the numeral “1”, or at the top with the numeral “1”). Additional markings may be provided.



NOTES:

- 1 The drawing standard used is ASME Y14.5M-1994
- 2 The geometry shown is for illustration only and does not imply any preferred or required construction.
- 3 Dimensions shown are: Millimeters / (Inches)
- 4 Dimensions and tolerances do not include draft.
- A The top left well of the plate shall be clearly marked (e.g.: on the left with the letter "A" or the numeral "1", or at the top with the numeral "1"). Additional markings may be provided.

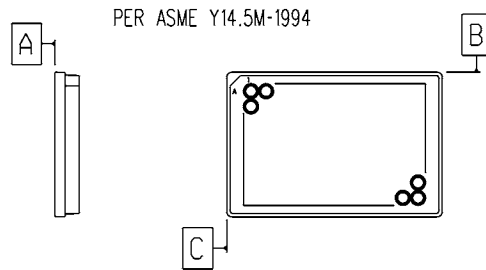
Figure 2- Well positions of a 384 well microplate

Annex

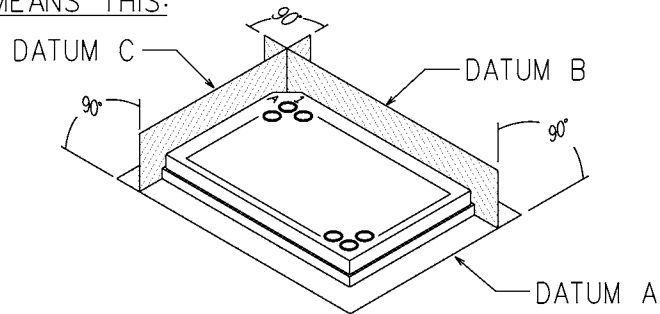
Annex A (Informative) Interpretation of Figures

Annex A is a general guide to interpreting figures in SBS standards in accordance with ASME Y14.5M-1994. Annex A is not intended to be a substitute for a working knowledge of dimensioning and tolerancing practices contained therein. The specific examples in Annex A are not comprehensive and may or may not apply to the figures in this particular SBS standard.

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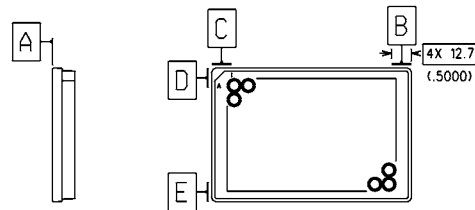
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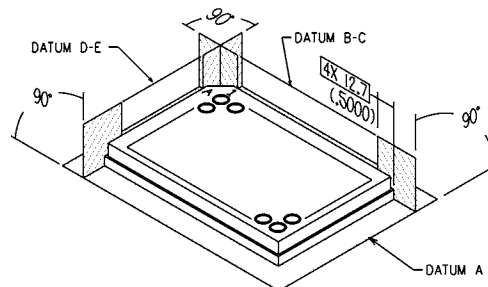
A.1 Specifying datum

THIS ON THE DRAWING:

PER ASME Y14.5M-1994 PARAGRAPH 1.7.3, 4.5.10, 6.3.1.2



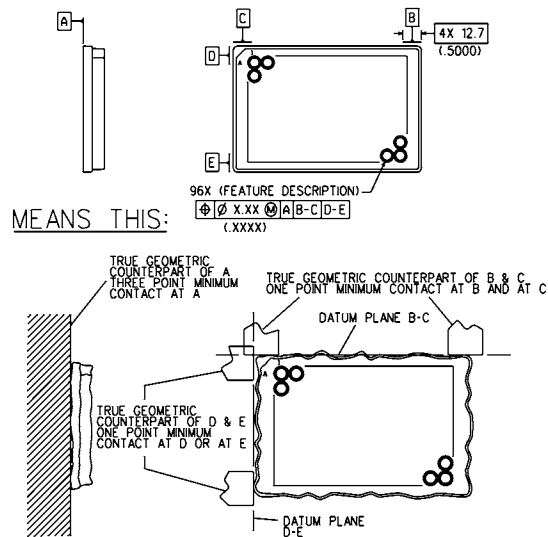
MEANS THIS:



A.2 Specifying composite datum

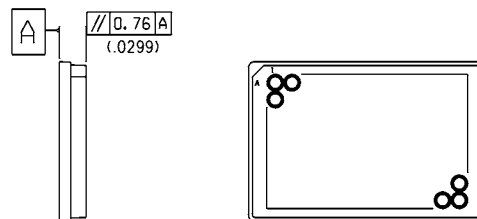
THIS ON THE DRAWING:

PER ASME Y14.5M-1994
PARAGRAPH 1.7.3, 4.5.10, 4.5.7.1



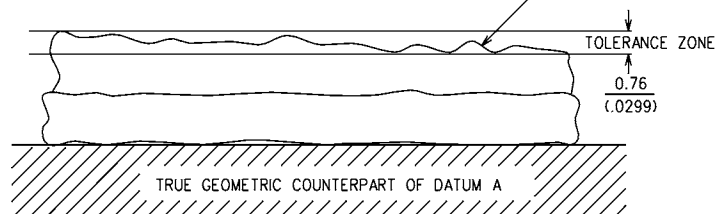
A.3 Application of composite datum

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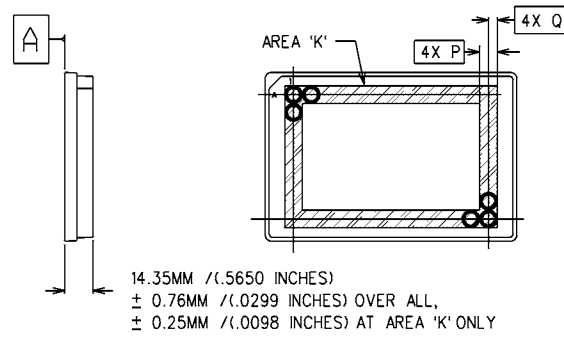
MEANS THIS: PER ASME Y14.5M-1994 PARAGRAPH 6.6.3.1

CONTROLLED SURFACE MUST LAY WITHIN A 0.76MM \pm (.0299 INCH) WIDE TOLERANCE ZONE, PARALLEL WITH DATUM A, AND MUST NOT EXCEED LIMITS OF SIZE

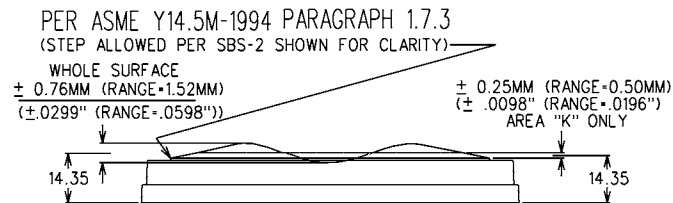


A.4 Parallelism

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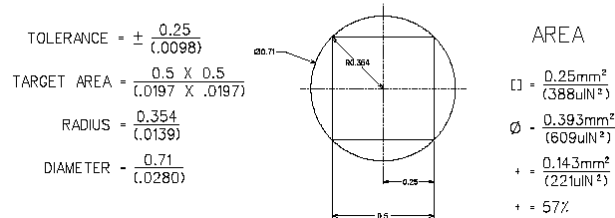
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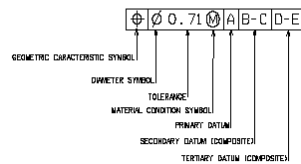
A.5 Tolerances over a limited area

PER ASME Y14.5M-1994
 PARAGRAPH 5.3.2.1

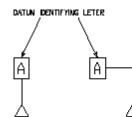
TRUE POSITION vs \pm TOLERANCE



PER ASME Y14.5M-1994
 PARAGRAPH 3.4.3



PER ASME Y14.5M-1994
 PARAGRAPH 3.3.2



A.6 True position vs \pm tolerance